

A model for a flare-productive region on the Sun obtained by Hinode

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The qualitative nature of the regions producing solar flares has been widely studied, which suggests that the regions tend to have a strong magnetic shear. We here present a quantitative description of the process leading to a flare. We studied the evolution of a flare-productive region by investigating the temporal development of magnetic helicity and current density in this region. These two quantities provide the information on a magnetic shear, and we focused on an active region NOAA10930 observed by Hinode to derive the temporal development of photospheric magnetic field. The photospheric magnetic field was then used to calculate the magnetic helicity injected into the solar atmosphere and the distribution of current density at the solar surface. Based on the results, we discuss the property of NOAA10930 that shows flaring activity. The property of flare-productive regions obtained here is a key to predicting the occurrence of solar flares that affect Sun-Earth system.